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CIVIL ENGINEERING ANALYSIS AND DESIGN SOFTWARE -LIMITATIONS OF END USERS AND FEEDBACK

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ABSTRACT

In civil engineering to analyze and design any structure there are various well known software like STAAD PRO etc. which are in use all over the world. Even though for end users there are limitations to use these software's for correct/critical analysis. The limitations and how to overcome these limitations are discussed in this research paper.

KEYWORDS: STAAD PRO, SAP, Analysis, Design, Substitute Frame Method

INTRODUCTION

Now a day all over the world to analyze and design any civil engineering structures, structural engineers are using various well known software like STAAD PRO., SAP etc. In STAAD PRO the end users (civil – structural engineers) are assigning the live loads on all slabs/floors or separately on beams. Almost all structural engineers are assigning the live loads on all the floors /slabs/beams and analyzing the framed structures. But assigning the live loads on all the floors/beams is not being the critical case. The critical case may be studied by substitute frame method for vertical loads, and for lateral or horizontal wind/seismic loads which can be analyzed by approximate method such as portal method, cantilever method, factor method etc. and critical case may be studied.

As in STAAD PRO the structures are analyzed by combinations of vertical and horizontal loads on the frames at a time by considering the live load on all the floors. But it is not a critical case because the live loads are assigned on all the floors.

If we take one example of multistory building having n number of bays and m number of storey. Then the analysis made by all most all structural engineers is not critical. e.g. in the design of slabs and beams the structural engineers are considering live loads on all the floors/beams and by using software they are analyzing and designing the structures.

If simply we consider one continuous slab or beam having spans more than three, it requires the various positions of live loads for critical case and which is not considered in the existing software. If the live load is considered on all the floors or beams it cannot give the critical case. If continuous slab or beam say having three or more spans requires various positions of live loads to get the maximum positive and negative bending moments in the span and maximum negative bending moments at supports. Also the nature of bending moment is also different for critical analysis which is not at all considered in the analysis and design by using any existing software.

If the continuous slab or beam ABCDEF having span equal or unequal lengths L is to be analyzed and design. Then if we are considering live loads on all the spans (live loads considered on all the spans ABCDEF)then we will not get the critical case for maximum positive and negative bending moments in the span and maximum negative bending moment

at supports. The nature and magnitude of bending moments are also different for critical case which can be analyzed by considering various positions of live loads, suppose we want the critical bending moment in the span CD, then we have to load the spans in two different ways to get maximum positive bending moment and maximum negative banding moment in the span. To get maximum positive and maximum negative bending moment in span CD, the alternate spans should be loaded including span CD and alternate span should be loaded excluding span CD respectively.

So it requires studying the various positions of live loads and critical bending moments at various critical sections. Because critical case depends upon the various position of live load. [2](ref. substitute frame method). So it is not possible or very difficult and laborious to consider all positions and number of trials of live loads even by using existing software to get the critical analysis. Critical analysis is highly impossible by using existing software, because it contains number of trials.

The critical analysis is requiring the maximum magnitude of bending moments and its nature which are different at various positions. If critical analysis is not done then the structures will not be more safe and durable. As in case span CD there it exists maximum positive and negative bending moment. And if we analyze by using the software, by analyzing loads on all the spans we are getting only positive bending moment in span CD and that is to be less than the critical case. And software cannot take in to consideration of negative bending moments in span CD. And because of that, structure is no longer safe for critical loading and though the load is not critical,

Also small hair cracks develop at the top of mid span of span CD as the negative banding moment in span CD is not considered in the existing software which leads to percolation of water and thereby corrosion of reinforcement also takes place, ultimately it reduces the life of the structure.

FEEDBACK

Critical analysis is required for safe design. And to get the critical section it is necessary to improve the software which takes into account the number of trials i.e. various positions of live loads. The software should be improved in such a way that it should take automatically all positions of live load on floors/beams for critical analysis.

CONCLUSIONS

The multistory structures analyzed by improved software will be safer as compared to existing software.

REFERENCES

1. STAAD PRO
2. Design of steel structures vol. II by Dr. Ramchandra and Virendra Gehlot, Scientific publishers (India)